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09/887,910 06/22/2001 Jack Hwang 42390P10625 7448

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EXAMINER

ANYA, IGWE U

ART UNIT PAPER NUMBER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 03282004

Application Number: 09/887,910
Filing Date: June 22, 2001
Appellant(s): HWANG ET AL.

Stephen M. De Klerk
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12 January 2004.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existence of any related appeals and interferences.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The amendment after final rejection filed on 20 October 2003 has been entered.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

The rejection of claims 1 - 22 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(8) *Claims Appealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

| | | |
|-----------|------------------|--------|
| 6,335,536 | Goeckner et al. | 1-2002 |
| 6,087,229 | Aronowitz et al. | 7-2000 |
| 6,432,780 | Chen | 8-2002 |

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1 – 22 are rejected under 35 U.S.C. 103(a). This rejection is set forth in prior Office Action, Paper No. 6, and follows for convenience.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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3. Claims 1 – 12, 14, 15 and 20 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goeckner et al. (US Patent 6335536) in view of Aronowitz et al. (US Patent 6087229).

4. Goeckner et al. teach a method and apparatus for low voltage nitrogen plasma doping of a semiconductor substrate using dual voltage pulses, comprising:

a plasma-generating voltage spacing less than 1 second interval of at least 1KV and an implantation voltage, the plasma being generated in the chamber between the anode and the substrate (col. 4 lines 10 – 65); an implantation voltage of 88 volts or lower (col. 6 lines 14 27); a plasma-generating voltage and implant voltage ratio of 10:1 or greater (col. 5 line 30 – col. 6 line 3); wherein the plasma-generating voltage and the implant voltage have the same period (col. 6 line 55 – col. 7 line 30); and a choice dependent reference voltage (col. 5 lines 40 – 55).

5. Goeckner et al. lack pulsed low voltage nitrogen plasma doping of a semiconductor substrate, comprising forming a conductive transistor gate on a dielectric layer implanted with ions with an implantation voltage of greater than 10 volts but less than 20 volts, and wherein the implanted ions increase the dielectric constant of the gate dielectric.

6. However, Aronowitz et al. teach a method for pulsed low voltage nitrogen plasma doping of a semiconductor substrate, comprising:

forming a conductive transistor gate on a dielectric layer implanted with ions (col. 8 lines 17 – 51);

implantation voltage of greater than 10 volts but less than 20 volts (col. 5 line 57 – col. 6 line 22); and

the implanted ions increase the dielectric constant of the gate dielectric (col. 5 lines 16 – 32).

7. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Aronowitz et al. with the Goeckner et al. reference to form a transistor having pulsed doped gate dielectric with uniform doping.

8. Claims 13, and 16 through 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goeckner et al. (US Patent 6335536) in view of Aronowitz et al. (US Patent 6087229) and further in view of Chen (US Patent 6432780).

9. The Goeckner/Aronowitz et al. reference teaches the features previously outlined but lacks the step of:

forming the plasma-generating voltage by application of a positive maximum to the cathode, and the implantation voltage potential by application of a negative maximum to the substrate.

10. However, Chen teaches a step comprising a plasma-generating voltage formed by application of a positive maximum to the cathode, and implantation voltage potential formed by application of a negative maximum to the substrate (col. 3 lines 6 – 20).

11. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Chen into the Goeckner/Aronowitz et al. reference as art recognized equivalent. Furthermore,

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provision for adjustability where needed involves only routine skill in the art. In re

Stevens, 101 USPQ 284 (CCPA).

12. Prior art considered but not used in the rejection include Ono et al. (US Patent 6184110), and Chen (US Pub. 2002/0132457).

(11) Response to Argument

The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA 1971) references are evaluated by what they suggest to one versed in the art, rather than their specific disclosures. In the instant case Goeckner et al. in col. 2 lines 1 – 10 disclose the benefits of a PLAD system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine both references to reduce levels of contaminants, particulates and surface etching damage, thereby improving implant uniformity. 37 CFR 1.111 (C) requires applicant to “clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited. Applicant has failed to clearly point out patentable novelty.

The affidavit under 37 CFR 1.132 filed 20 October 2003 is insufficient to overcome the rejection of claims 1 - 22 based upon Goeckner et al. in view of Aronowitz et al. applied under 35 U.S.C. 103 as set forth in the last Office action because: Goeckner teaches a method of achieving uniformity in low energy plasma doping using pulses, and Aronowitz et al. teach low energy plasma doping of a gate dielectric.

The affidavit is directed to Applicant's "belief" on limited usage of a Varian PLAD machine, and applicant's modification of the Varian PLAD machine. It fails to address patentability in the instant application as the claims are drawn to method of making a semiconductor transistor and not to method of use of an apparatus or structure thereof. Thus, there is no showing of objective evidence of nonobviousness commensurate in scope with the claims. To be given substantial weight in the determination of obviousness or non-obviousness, evidence of secondary consideration must be relevant to the subject matter as claimed. See MPEP § 716.

Applicant's affidavit asserts the Varian tool is "typically" used to implant ions to form source and drains. This assertion is unfounded and even if accepted does not rule out other uses of the Varian tool. In assessing the probative value of an expert opinion, the examiner must consider the nature of the matter sought to be established, the strength and of any opposing evidence, the interest of the expert in the outcome of the case, and the presence or absence of factual support for the expert's opinion. *Ashland Oil V. Delta Resins*, 776 F.2d 281, 227 USPQ 657.


Applicant's affidavit asserts a modification of the Varian Tool to provide one order of magnitude of less power. There is absence of a nexus between the merits of the claimed method invention and this evidence. Furthermore, where the unexpected properties of a claimed invention are not shown to have a significance equal to or greater than the expected properties, the evidence of the unexpected properties may not be sufficient to rebut the evidence of obviousness. *In re Nolan*, 553 F.2d 1261, 1267, 193 USPQ 641, 645 (CCPA 1977).

The ultimate determination of patentability must be based on consideration of the entire record, by a preponderance of evidence, with due consideration to the persuasiveness of any arguments and any secondary evidence. In re Oetiker, 977 F.2d 1443, 24 USPQ 2d 1443. In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

~~Igwe U. Anya~~
~~Examiner~~
~~Art Unit 2825~~




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April 14, 2004

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